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ABSTRACT

A seminar explored technology issues related to migrant education and ways to make technology accessible to migrant students in light of migrant family lifestyles, limited migrant education funds, and the supplemental role of migrant education. This report synthesizes information and recommendations given by seminar presenters about seven steps for implementing technology for migrant students. These steps (and related topics) are: (1) determining the technology skills needed at each grade level (state technology standards and related action steps for migrant educators); (2) examining research on the relationship between technology use and student achievement (evolution of technology use in education and evidence from school-based implementations); (3) developing a technology implementation plan (critical questions, plan components, and specific challenges for migrant educators); (4) implementing professional development strategies for teachers and administrators; (5) determining which technology will best accomplish the plan; (6) reviewing online learning programs, software, and education technology models, and selecting those appropriate to project goals; and (7) identifying collaborative partners and resources to help carry out the plan. Also included are summaries of 10 technology projects in migrant education, lists of resources, observations of state directors of migrant education, and a summary of implementation steps. Appendices compare California technology standards with international standards and list online initiatives for professional development, useful Web sites, seminar participants, and members of the Interstate Migrant Education Council. (SV)

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Technology:

Anytime, Anyplace, Any Pace Learning

Proceedings Report

Seminar on Technology for Migrant Students

Sheraton Gateway Hotel
San Francisco International Airport
Burlingame, California
June 7–9, 2001

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Patricia A. Ward

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The title of this report is based on remarks presented by John Fleischman.

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The text of this report was prepared by Patricia A. Ward, education consultant.

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The Interstate Migrant Education Council (IMEC) is an independent organization whose members are appointed by their state's chief school officer. IMEC volunteers are prominent individuals who contribute time and expertise to enhance educational opportunities for migrant students who are without a natural advocacy group. The members examine policy issues concerning coordination between public and private agencies at all levels of government. IMEC members include a state chief school officer, state legislators, state board of education members, state education agency personnel, local and district school representatives, state directors of migrant education, a parent and an employer of migrant families.

IMEC's mission is:

To advocate policies that ensure the highest quality education and other needed services for the nation's migrant children.

August, 2001
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The North Central Regional Laboratory, through Director **Gina Burkhardt** and Assistant Director **Gil Valdez,** supported the agenda presentation on research presented by **Robert Blomeyer.**

The following people provided contacts for speakers and suggested ideas for agenda content: **John Fleischman** from the Sacramento County Office of Education, **Michael Franken** and **Mike Abell** from the Kentucky Migrant Technology Project, Project Director **Bernie Trilling** and staff person **Jacinto Salazar** from the Southwest Regional Technology in Education Consortium, **Kristin Ciesemier** from the North Central Technology in Education Consortium, and **Wende Allen** from Northeast and Islands Regional Technology in Education Consortium.

Several individuals gave presentations at IMEC meetings that helped crystallize the issues for the seminar. The five Technology Grants for Coordinating Teaching and Learning in the Migrant Community engaged in a full day's discussion with IMEC members and provided exhibits at the seminar. They are Anchor School Project, **Jean Williams**, Director, and **Jane Griffin**, presenter; Migrant Education Consortium for Higher Achievement (MECHA), **Janie Greenleaf**, Director; ESTRELLA, **Brenda Pessin**, Director; Kentucky Migrant Technology Project, **Michael Franken**, Director and **Mike Abell**, Co-Director; InTIME Migrant Technology Grant, **John Tenny**, Director. Other presenters were **Steve Sanchez**, New Mexico Department of Education; **Manuel Recio**, Pennsylvania Department of Education; and **Guido Prambs**, Cyber High Fresno.

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Foreward

In 1999, IMEC stated, "More than any other educational service, activity or intervention, technology has the potential of permitting migrant students to overcome obstacles in their educational progress. Technology is probably the most important tool in helping these children achieve educational equity. It can enhance migrant students' learning and provide them the opportunity to have continuity in their educational programs." With this statement in mind, IMEC made one of its goals for 2001-2002 to "Identify effective practices to ensure migrant students have access to technology for instruction and learning equal to the best available for students in the United States."

The Seminar on Technology for Migrant Students was the culmination of eighteen months preparation that included:

- an IMEC work group that outlined the important issues with the primary focus on access for students,
- presentations to IMEC members by technology and migrant education practitioners, and
- discussions with staff of the five Technology Grants for Coordinating Teaching and Learning in the Migrant Community Projects funded by the United States Department of Education, Office of Migrant Education.

The seminar brought together the best available experts in the country to address technology related topics, and to explore ways that, given migrant family lifestyles, limited migrant education funds, and the supplemental role of migrant education, access to technology can be made available to migrant students.

The seminar was designed to address educational technology issues in the following key implementation areas: student skills, research findings regarding the relationship between technology and student achievement, planning for technology, professional development, available technology, online learning, education technology models, and the development of partnerships.

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The Migrant Child Should Not Be Left Behind

Introduction

Technology can play a role in the education of migrant children.

How do we provide the best education for migrant children? Answering his own question Francisco Garcia stated that, "In all honesty there is not, and has never been, an easy answer to that question, but technology can play a role in the solution." Migrant families are mobile; many travel back and forth from Mexico. But, technology has no borders. The question is how to get the mobile family connected. How to ensure that migrant children have access to technology and to the opportunity it can give to them to graduate from high school? How to ensure that migrant children have the option to decide to go to college, to join the military, to join the workforce? There are many components in the solutions that education offers. Technology is one component.

Francisco Garcia
Director
Office of Migrant Education
U.S. Department of Education

In "Technology Counts 2001" in the May 2001 issue of *Education Week*, Robert Johnston reports a correlation between higher income and better education to adequate access to technology. Age, gender, ethnicity, race and geographical location were also cited as factors reducing the chance of adequate access to technology. According to *Falling Through the Net: Defining the Digital Divide*, a publication of the United States Department of Commerce, 2000, Hispanic households are half as likely to have a computer as white counterparts. Urban households with incomes of more than $75,000 are 20 times more likely to have Internet access than rural households. These statistics clearly place migrant children in that segment of the population that does not have adequate access to technology; and it is closely related to the achievement gap for migrant children.

"The digital divide is where a disproportionate segment of the population does not have adequate access to technology."

Maureen Yoder

Migrant students have a graduation rate of 50.7 percent. On the other side of those numbers is a potential loss of 49.3 percent, a loss of economic, social, intellectual, and workforce contributions that migrant children could make to this nation. The economic implications for migrant students and families are tremendous. This issue must be addressed. This cannot continue to be a world of haves and have nots.

Low graduation rates for migrant students represent a significant loss to the nation.

Technology is important as a tool to help migrant children stay in school, increase graduation rates, and prepare for future jobs; but it is one of many tools. There is a range of service needed by migrant children: literacy, content areas, health, and housing. The President and Congress have declared that "no child will be left behind". The child that must not be left behind must also be the migrant child.

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Seven Steps to Implement Technology for Migrant Students

The following steps are a format for the implementation of technology education for migrant students. Information about each of the steps was provided by seminar presenters. A synthesis of that information and recommendations for implementation are included in this report.

Step 1	Determine the technology skills students should have at each grade level.	**Page 8**
Step 2	Examine the research regarding the relationship between the use of technology and student achievement.	**Page 10**
Step 3	Develop a technology implementation plan.	**Page 14**
Step 4	Implement professional development strategies that support teachers and administrators.	**Page 17**
Step 5	Determine the technology that will best accomplish your plan.	**Page 20**
Step 6	Review online learning programs, available software and education technology models; and select those that will help you achieve your goals.	**Page 23**
Step 7	Identify collaborative partners and resources that can help you carry out your technology plan.	**Page 31**

Additional Issues for Migrant Education

In addition to the general concerns related to the implementation of technology in education, Migrant Education Programs must consider three additional issues.

Supplementary Program: The Migrant Education Program is a supplementary program to regular local education agency services and Title I, Part A services. In each state and in each school the Migrant Education Program has to decide how to build on the technology available, be an advocate for migrant students, and provide technology when it is not otherwise available in order to provide full access for migrant students.

Limited Resources: The average amount of funding per eligible migrant student is only $460 per year. Migrant Education Programs must decide if expenditures for technology should replace existing services, or if that is not feasible, how to leverage other funds for technology services that are in addition to their current program.

Lifestyle: Migrant students, by the nature of the work of their families, often attend more than one school each year, sometimes live in camps and temporary residences without telephones, and have limited family financial resources. This lifestyle creates the critical issues of access to technology and continuity in the use of technology.

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Step 1:

Determine the technology skills students should have at each grade level.

Learning Standards for Technology

The development of learning standards for technology should be based on answers to two questions.

- ✓ *What long-term technology goals should we have for students to enable them to become global citizens?*
- ✓ *What technology skills should be taught to students at various grade levels?*

Bridget Foster
Director
California Learning Resource Network
Stanislas County Office of Education

International Society for Technology Education (ISTE)

ISTE strives to improve K-12 education by publishing innovative educational resources that suggest ways to connect curriculum and technology, by maintaining a web site at http://www.iste.org and by sponsoring professional development workshops. The Web site includes a searchable database and lessons aligned to standards that can be purchased or downloaded. Through a partnership with a number of foundations, government groups, corporations and professional organizations, ISTE developed the National Educational Technology Standards (NETS), which is a framework of six standards for technology literate students and grade level performance indicators. NETS standards include:

- Basic operations and concepts;
- Social, ethical and human issues;
- Technology productivity tools;
- Technology communication tools;
- Technology research tools; and
- Technology problem-solving and decision-making tools.

ISTE Standards and California Standards

ISTE Standards and State Technology Standards

In a survey of learning standards for states Bridget Foster found varying approaches to implementing technology skills. Some states have specific standards for technology, and other states have technology standards embedded in their learning standards for content areas. While some states begin teaching technology skills in kindergarten, most begin at the fourth grade level, and most begin with keyboarding.

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In general, NETS introduces skills at an earlier grade level than do many states. California, for example, does not address technology at the K-2 grade level whereas ISTE feels that K-2 children should be able to use input and output devices, use a variety of media and technology resources, and, with the assistance of a teacher or parent, create developmentally appropriate multimedia products. At the high school level California standards integrate database functions such as spreadsheets and graphics, into word processing documents to create more work place type products. ISTE, on the other hand, moves students into the realm of leadership in terms of technology skills. Students are expected to make informed choices among technology systems and resources, advocate for legal and ethical behavior with regard to the use of technology and information, and collaborate with others and use technology to produce work that contributes to a content-related knowledge base.

Appendix A gives an illustration of a comparison between sample ISTE standards and sample state standards. Migrant state directors should make a similiar comparison.

Action Steps for Migrant Educators

Foster suggested several action steps for migrant educators to take regarding technology standards in their states.

- Examine state content standards to determine if your state addresses technology with separate standards, or with standards that are embedded in content areas. If technology standards are embedded, how do they integrate with the content areas? How do state standards for technology compare to NETS ? How do state standards compare with the standards of other states that migrant students are exposed to in their travels?
- Work with legislators and policymakers to determine how technology is addressed and how it should be addressed in the state.
- Determine technology competencies needed by students when they graduate and enter the job market.
- Determine skills needed by teachers and administrators to be effective educators.
- Develop a state implementation plan. How can funds be obtained for infrastructures within the educational system, purchase of hardware, software and appliances, staff development for teachers, administrators and community members? How can access to the Internet be made available for all students including those who do not have telephones in their homes?

Additional Resources

- **Putnam Valley Central Schools Developing Education Standards** - This site contains an annotated list of Internet sites with K-12 educational standards and curriculum frameworks from around the nation and around the world. http://www.putnamvalleyschools.org/standards.html

- **National Education Technology Goals** –The United States Department of Education completed an 18-month effort to rethink and revise the national strategy for effective use of technology in elementary and secondary education. http://www.ed.gov/Technology/elearning/index.html

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Step 2:

Examine the research regarding the relationship between the use of technology and student achievement.

Research in the Educational Use of Technology

The educational use of computers as tools to support learning began in the 1980's. Now, after 20 years and an extensive investment of time, money and effort, educators must ask is there research that indicates that the integration of technology in education is a worthwhile endeavor? Does technology influence student achievement? Is the pedagogical approach of teachers modified by the introduction of technology in the classroom? Is the meaning of education changed for students? Can technology help build educational programs that are data driven? Is there research evidence that educators can use to make informed decisions regarding the implementation of technology in education?

Robert Blomeyer
Program Associate
North Central Educational Laboratory

Impact of Educational Technology on Student Achievement

Addressing these inquiries, Robert Blomeyer, Research Associate at the North Central Regional Educational Laboratory (http://www.ncrel.org), provided an overview of the impact of learning technologies on academic achievement. Basing his remarks on information in *Computer-Based Technology and Learning: Evolving Uses and Expectations*, three historical phases in the evolution of technology in education were outlined: print automation, expansion of learning opportunities, and data driven virtual learning. Although chronological in their evolution, the phases are not mutually exclusive. Schools or programs may use technologies from more than one phase at the same time to address different purposes.

Computer-Based Technology and Learning: Evolving Uses and Expectations prepared by G.Valdez and others, North Central Regional Technology in Education Consortium, May 2000.

Phase One - Print Automation: When implemented in the 1980s, computer-assisted instruction used desktop computers with limited memory, and software that was basically textbooks presented in electronic print formats. Teachers had little input into the development or selection of programs. Students used computer labs for drill and practice to learn specific skills or to remediate education deficiencies in content areas like math. Phase One computer assisted instruction appears to be more appropriate in settings where the teacher's content knowledge and skills are low as the use of computer-assisted instruction scaffolds teachers' deficiencies. Student achievement gains are measured by standardized achievement tests.

For each phase two questions are addressed. What is the evidence that the use of computer technology has a positive impact on learning? What significance do the findings from research have for educators as they make technology-related decisions that impact student learning?

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A large body of research indicates that, if there is a good match between the content of the drill and the stated instructional objective, Phase One computer-assisted drill and practice is highly effective in helping students learn specific isolated skills, especially in content areas with defined structures like mathematics.

Phase Two - Expansion of Learning Opportunities: In the 1990s the focus of technology shifted to the use of computers as tools for student-centered learning. The Internet made the world of information readily accessible. Word processing and powerful software programs helped students analyze, store, and reshape information and "publish" their work. Students became experts in their area of inquiry and shared their knowledge with other learners. The teacher's role changed to one of facilitator and guide, pointing students in new directions, providing feedback, and stimulating discussion. The use of the computer as a real world tool within the curriculum promoted students to active participants in the learning process, enhanced student problem solving and inquiry, and helped students develop higher order thinking skills.

The ability to access, organize, display and communicate information does not measure well in terms of outcomes on standardized tests. Student growth in this phase is best determine through authentic assessment procedures that examine student products and evaluate new knowledge and skills against rubrics that are closely aligned to learning standards and curriculum requirements.

The evidence that Phase Two computer-facilitated learning increases student achievement is weaker. Research on computer facilitated learning indicates that successful student outcomes are dependent on a match among goals of instruction, student characteristics, software, technology, and teacher implementation decisions. Evidence from meta-analysis research indicates positive student outcomes such as enhanced social skills and human cognition as demonstrated by problem-solving and inquiry-based learning, increased student-to-teacher and student-to-student interaction, and extended cooperative and collaborative learning. Although the evidence is weaker, technology in Phase Two can be considered a success because it facilitates and supports learning and offers a range of applications to meet learner goals.

Phase Three - Data Driven Virtual Learning: Phase Two segues into Phase Three with the use of computer mediated communications. The ubiquitous access to email and the capacity to communicate as individuals or groups with people at great distance has a tremendous impact on instruction. To access resources and perform collaborative and communicative activities over distance, however, students must be connected through a modem or a high-speed network.

Computer mediated communications makes it possible for students in a Spanish class anywhere in the United States to be linked with students who are learning English in a school in Mexico or in South America or in Spain.

Phase Three computer assisted learning has two foci: (1) classroom changes and (2) administrative changes. In this phase, Internet resources help administrators, school boards, and policy makers make decisions in the design of learning environments, the expenditure of monetary resources, and the selection of hardware and software. The Internet provides teachers with access to always-available data and information to help meet accountability expectations.

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Research in this phase suggests success in advanced courses and higher-order skills such as critical thinking and complex problem solving for some home and school computer, email, and multimedia applications. Gains, however, may not be evidenced in year to year testing. Research indicates that, in this phase, successful use of technology in educational settings is dependent on quality professional training, customized technology that addresses the learning standards and learning needs of students in specific schools or programs, and long-term implementation plans.

Evidence from School-Based Implementations

Findings from school, regional and state-wide technology implementation projects report that increased technology access for students increases student achievement.

Research reported by the National Center for Educational Statistics indicates that the second most important influence on student test scores is instructional opportunity. In regard to the educational use of technology, this finding is crucial because it speaks to the issue of equitable access to computers, to the Internet, and to telecommunications.

The LAAMP Project: The Los Angeles Annenberg Metropolitan Project (www.laamp.org) which is part of the Annenberg $550 million challenge to improve public schools, grouped schools in the Los Angeles Public School District according to geographic and socioeconomic similarities. School groups were called school families. Five school families were awarded funds to develop technology initiatives that were expansions on their existing technology bases. The technology initiatives of each of the families were different and were designed to meet local objectives. Project evaluations concluded that school families expanded their capacity to integrate technology into teaching and learning, improved curriculum and instruction, and improved students' learning, behavior and academic performance. (North Central Regional Educational Laboratory. (2000). *The Technology Initiatives of Five School Families in the Los Angeles Annenberg Metropolitan Project: December 1998 Through June 2000.* Oak Brook, IL: NCREL.)

Madison, Oneida, Herkimer, Jefferson and Lewis Counties in central New York: A consortium representing Madison, Oneida, Herkimer, Jefferson and Lewis counties in central New York spent 14.1 million dollars on computer technology and professional development giving the region a student-computer ratio of seven students per computer. An extensive three-year study of 55 school districts in the consortium concluded that increased technology supports, facilitates and encourages student achievement, and that gains span schools and districts with different educational policies and socioeconomic backgrounds. (Mann, D. & Schaffer, E.A. (July 1997). Technology and Achievement. *The American School Board Journal*, 22-23.)

Harvey Barnett, Senior Research Associate at WestEd (http://www.wested.org), outlined findings from research studies of technology implementations in three educational settings that indicate that the use of technology focused on content standards can make a difference in academic achievement.

Many investigations have found that students who use technology feel more successful in school, more self-confidence, and are more motivated to learn.

West Virginia Study: A hard methodological study of the implementation of technology in schools in West Virginia completed in 1999 found that technology helps students have positive affects and achievement in all subject areas. The West Virginia implementation plan began by placing computers in kindergarten classrooms, and training kindergarten teachers to select software that met the state content standards, and to use technology to support learning. The second year technology was implemented in the first grade, then the second grade, on up to the sixth grade. Researchers found that year after year students who had been in classrooms where there was technology in the classroom scored significantly better on the state's achievement tests than students who did not have technology in the classroom. And, although there was no technology in junior and senior high, student gains continued. Students who had experienced technology in their classrooms from kindergarten through sixth grade took more advanced placement (AP) classes, had higher attendance and graduated from high school at higher rates. Another important finding from the study is that, because technology levels the playing field, students who use technology often have improved self-esteem and improved self-concept. (Mann, D., Shakeshaft, C., Becker, J. and Kottkamp, R. (1999). *West Virginia Story: Achievement Gains from a Statewide Comprehensive Instructional Technology Program.* State Education Department at Charleston, WV.)

East Los Angeles and Columbus, Ohio: Students in East Los Angeles schools who were involved in long-term technology projects graduated at significantly higher rates than students who were not involved in technology programs. In addition, technology classrooms became like sanctuaries where any student could work on projects and no gang issues came up. In Columbus, Ohio 100 percent of students from a regular ninth grade high school class who were placed in an Apple Classroom of Tomorrow project class graduated from high school and 90 percent went onto college. The dropout rate at that school was over 40 percent and the college entry rate was less than 20 percent.

Summary of Benefits of Technology in Education

Reports of best practices and program evaluations indicate that technology in education makes both learning and teaching for students and teachers more productive and engaging. The benefits of technology to education are numerous. They include:

Technology redefines student and teacher roles, increases efficiency for the management of instruction, energizes students, and gives them space to explore, inquire and make connections between prior knowledge and new information.

- access to tremendous amounts of information;
- support for independent inquiry that helps students make discoveries;
- problem-based learning and investigation of real world problems;
- interactive communication between students and teachers;
- cooperative learning, shared knowledge, and group problem solving;
- constructivist teaching strategies;
- aid to teachers in the preparation of teaching material;
- online professional development;
- communication among teachers through telecommunications; and
- management of school records.

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Step 3:

Develop a technology implementation plan.

Planning for Technology

Technology can make a huge difference in the educational environment of a school or program. As a tool to support learning it can promote students' acquisition of higher order thinking skills, academic achievement and positive self-esteem. As a resource to teachers it can provide lesson plans, teaching material and distance learning classes to enhance professional skills. As a help to administrators it can manage school and student records and provide data that is the basis for improved learning environments. These benefits begin with an effective plan.

Critical Questions for Technology Planning

Harvey Barnett, Senior Research Associate at WestEd (http://www.wested.org), outlined five critical questions to consider as preliminary steps in the development of technology integration plans.

- ***Do teachers currently use technology as a tool to support learning?*** Whether in the school or a community technology center, technology use should be connected to learning, integrated in the curriculum, and tied to learning standards. While computer use may be fun, it should be more than a free time activity.

- ***What does research say about the effect of technology on student achievement?*** Research should inform the implementation of technology because it answers the "so what" question. Studies of technology implementation efforts in schools in West Virginia, East Los Angeles, and Columbus, Ohio have found that the educational use of technology focused on content standards does have a positive effect on student achievement and on student self-esteem. Students in classrooms where technology was available scored higher on state achievement tests, had better attendance, took more AP classes, and graduated at higher rates. A summary of relevant research is being prepared and will be available on the WestEd web site.

- ***What hardware and software is already available?*** Conduct a technology audit to determine what hardware, software and appliances are already owned by the school, where they are located, and how they are being used. Based on the audit plan to purchase new items that build on and complement items already available.

- ***How will the technology implementation be evaluated?*** This is an era of accountability. Technology must help students meet state content standards. What process will be used to document that it does?

Harvey Barnett
Senior Research Associate
WestEd Technology in Education

Stakeholders must have a clear vision of their school or program's learning expectations for students and the role that technology can play in supporting achievement of those expectations. Based on that vision, a detailed technology implementation plan that considers professional development, the integration of technology with curriculum, selection of hardware and software, funding and evaluation can be formed.

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- ***What is the commitment of school leaders to technology implementation?*** Development of leaders who are committed to the educational use of technology is possibly the most important component in the preliminary stage of planning because the quality of any school program and the degree to which schools offer special programs to students depends on the vision of the principal or program director and his or her ability to carry that vision out.

Components of the Plan

The prototype technology planning scheme outlined by Dr. Barnett includes five important components: curriculum, professional development, equipment, budget, and evaluation. The form that each component assumes in the plans of a particular school or program is guided by the program's vision for technology; and configured by the its preplanning findings.

- **Curriculum:** What technology will best support teachers and help students meet accountability standards? What software will teach content standards?

- **Professional development:** What is the current knowledge and skill level, and comfort level of the teaching staff? What training is needed to help teachers integrate technology into their teaching activities? How can teachers be convinced that technology will have a positive impact on student performance? Who can provide needed training?

An extensive Technology Planning Toolkit is available online at the WestEd web site. Rubrics, checklists, and, where appropriate, links to other web sites are included in the kit. "Putting the Pieces Together: A Satellite Video Conference on Technology Planning" is suggested as a prerequisite to using the planning tools. The video can be obtained by email from WestEd.

- **Equipment:** What hardware is needed to build on or supplement computers already owned? What upgrades are needed in the school's infrastructure? How will ongoing technical support to assist staff and to make repairs to equipment be provided?

- **Budget:** What money is needed for initial purchases and upgrades, and to conduct initial staff training? Where can those funds be obtained? How will ongoing technical assistance and professional development be supported? The following is a funding formula that works well.
  - 40% hardware
  - 20% software - basic operating software, instructional software, and productivity software for teachers
  - 20% professional development
  - 20% upgrades – more memory, new appliances

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- **Evaluation:** How will the technology implementation be monitored and evaluated to ascertain that education objectives are met and that money is well spent? Suggestions for monitoring include:

  - built-in assessment tools;
  - surveys that ask students and teachers about their use of the technology;
  - observations of staff and students using technology;
  - artifacts created by students with technology tools;
  - focused interviews; and
  - rubrics.

Specific Challenges for Migrant Education

Certain challenges and conditions need to be addressed if migrant students are to profit from the use of technology.

- **Access:** Migrant students need access to technology that is regular, reliable and available when needed by the student. Migrant educators need to champion for access for migrant students at the school and district level, and plan for supplemental access to meet student needs outside of school. Are migrant students afforded the same access to computers as other students in schools they attend? What provisions are included in the school district's technology plan for special populations? How can migrant education supplement computer access for migrant students? Are laptops, I-Books, battery operated keyboards options? Is wireless available in the geographical area? Can Web TV be provided?

- **Mobility:** How can the mobility issue be addressed in a way that allows migrant students continuous access to technology as they move from location to location? What answers have been discovered by Migrant Technology Projects? Can smart cards be utilized?

- **Resources:** Migrant students do not bring resources to schools. They may not be counted in Title I programs and are not supported by 504 plans like special needs children. How can migrant educators and parents advocate for the inclusion of migrant students in the resources available at the school?

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Step 4:

Implement professional development strategies that support teachers and administrators.

Peggy Kinder
Project Manager
Distance Learning Resource Network
WestEd Technology in Education

Essential Elements of Professional Development

Student achievement is acutely influenced by teachers' knowledge of content and teaching tactics. Professional development activities that provide teachers with information about how technology enhances student success, and that include information about telecommunications, basic computer troubleshooting, and the use of software tools, help teachers gain competence and confidence with computers. Effective teacher training coupled with knowledgeable school and program leaders who support the integration of technology with curriculum are key to successful implementation. Administrators need information about how technology works, what represents quality and what difference it makes to student success. Educators who are knowledgeable about and comfortable with the use of technology as a learning tool help students acquire knowledge and skills that broaden their work and life options.

Time, money and support are essential to the success of professional development efforts. The lack of these elements become barriers that impede the attainment of training goals.

Time: To enhance the acquisition of new knowledge and skills, information should be presented in small segments over an extended period of time with opportunity for reflection and practice between sessions. To change a teacher's teaching style from lecture to a plethora of teaching strategies requires a commitment of about five years. Training delivered to large groups in one-day or two-day sessions with little follow-up is ineffective. Participants need to understand and be willing to invest the time required to learn new skills and to complete training, especially online training.

In an analysis of education policies the strongest predictor of a state's average student achievement level is the proportion of qualified teachers. (Darling-Hammond, L. (2000). Quality and Student Achievement: A Review of State Policy Evidence. *Education Policy Archives. Volume 8* http://epaa.asu.edu).

Money: Sufficient money should be budgeted to support staff development efforts. In his outline for the implementation of technology, Harvey Barnett states that 20 percent of a school or program's technology budget should be targeted for staff development activities. Money for staff development should include the cost of substitutes to allow teachers to attend training activities, the cost for coaches and technical support, and money to reward teacher efforts through mini-grants.

Support: School and program policies must ensure that teachers have the support needed to learn new skills and strategies associated with the use of technology as a learning tool. Teachers should learn to use available online resources to aid them in their implementation of technology with students.

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Characteristics of Effective Professional Development

In her remarks to seminar participants, Peggy Kinder outlined the following characteristics critical to effective professional development. Training should:

- be long term and developmental, presented in small segments over time;
- include opportunities for local follow-up assistance;
- engage teachers in tasks that are embedded in their teaching responsibilities and relevant to their work with students;
- be result-driven, immersed in subject matter, and tied to standards;
- incorporate demonstrations, trials and feed-back;
- provide opportunities for learners to participate in the planning of the training;
- provide training situations in which the adult learner is a partner with the instructor;
- include two-way communication between learners and the instructor, and opportunities for learners to share knowledge with other learners; and
- be conducted in environments in which learners feel supported.

Effective professional development activities specifically about technology, whether online or face-to-face, include four additional elements. Training should:

- be hands-on;
- help teachers understand their new role more as guides and mentors and less as dispensers of knowledge;
- help teachers develop a support system; and
- provide opportunities for teachers to continue to change and practice when they return to their teaching environments.

Online Professional Development

Online training is a promising approach that can overcome barriers to professional development and help teachers increase their competencies. In one research study the Pacific Resources for Education and Learning (PREL) Regional Educational Laboratory compared the relative effectiveness of online and face-to-face professional development. They found that Algebra students whose teachers participated in online training achieved higher grades and had a higher rate of course completion than students of teachers who took their training in face-to-face classes. They attributed the difference in student achievement to the opportunity afforded teachers who received their training online to ask questions and receive ongoing support. In a survey to ascertain teachers' use of technology, 36 percent of teachers reported using the Internet as a way to improve skills. Distance learning, however, is not suitable for every learner and has a high

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dropout rate. Peggy Kinder outlined several factors that influence the likelihood that online professional development will be successful. They include:

- strong content, even more important in online professional development activities because it speaks to the motivation of the learner;
- technology that works well, that is reliable and up most of the time;
- technical support that the learner can call if problems occur with the technology;
- an understanding on the part of the learner of the personal investment in time and effort needed to participate in and complete the training;
- linkages with other learners taking the course that build a sense of community in an online environment;
- opportunity for learners to interact with other learners;
- instructors that are accessible to answer students' questions, give feedback to completed assignments, instruct students about where to find resources; and
- real work that has context in the learners' daily activities.

Kinder summarized several online initiatives that offer effective professional development opportunities to educators. A list of these initiatives can be found in **Appendix B.**

Two Projects Exemplify Professional Development

Technology alone cannot change the way that students are taught. Ultimately it is teachers who make decisions about classroom experiences. Appropriate professional development that includes hands-on access to computers, ongoing support and adequate time to learn new skills is a catalyst that has the capability to modify instructional practices.

The BorderLink Project and the Challenge 2000 Multimedia Project (see page 28) incorporate effective teacher training strategies that influence the integration of technology in educational practice and impact student achievement. BorderLink provides teachers with an intensive summer institute and year-long technology integration courses. Online professional development opportunities are available through the California Technology Assistance Project (CTAP). Follow-up activities and a workshop series are provided for teachers, administrators and counselors throughout the school year. A teacher-training component is key to the successful implementation of Challenge 2000 Multimedia Project activities. It includes summer institutes, monthly workdays with release time from school, networking opportunities, coaching, technical support, and mini-grants that reward teachers' efforts by enabling them to purchase software and technology appliances to use in their classrooms.

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Step 5:

Determine the technology that will best accomplish your plan.

Available Technology

The microchip has forever changed our lives.

John Fleischman
Director
Instructional Technology & Learning Resource Center
Sacramento, California County Office of Education

In his remarks, John Fleischman suggested that the most significant invention in our lifetime is the microchip invented in 1959. It has forever changed our lives because literally almost everything we deal with from hand held computers, to cell phones, to microwaves, to automobiles, to everything in our lives that is electronic has microchips in it. And that has changed, and continues to change, so much of how we function.

More Power – Less Cost

Over 30 years ago Gordon Moore, co-founder of INTEL, the company that makes most of the chips that run most of the computers that we deal with, predicted that the speed and power of computers would increase, and, as they did, the cost would decrease. In 1979 the first computers that came out had 24K RAM (random access memory), 2 megabytes of storage space and cost $5,000. In 1998 computers had 16 megabytes of RAM, 166 megabytes of storage space and cost about $1,400. Today the average computer has 64 megabytes of RAM, 8 gigabytes of storage space and cost about $400. By projecting Moore's law to 2010, the computer will have 10,640 megabytes of RAM, 1.2 terabytes of storage space and will cost about $10.

Year	Memory	Storage	Cost
1979	24K	2 megabytes	$5,000
1998	16 megabytes	166 megabytes	$1,400
2001	64 megabytes	8 gigabytes	$400
2010	10,640 megabytes	1.2 terabytes	$10

"The processing power and speed of any electronic calculating computer doubles evey 18 months. At the same time the price for that technology decreases by 50 percent."

Gordon Moore

As the cost of computers continues to decrease, the movement toward getting information off the network, whether it is a local network or the big network, which is the Internet, will grow. As the proliferation of technology appliances continues, greater numbers of people will have greater numbers of options for accessing Internet resources. You begin to sense the kind of change that is happening and the potential of that change to impact people's lives including the lives of mobile populations.

Lower cost and proliferation of appliances increase options for access to the Internet for mobile and rural populations.

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Consider the incredible changes that have occurred in technology over the last three decades. Thirty years ago modern technology consisted of rotary telephones, records and, later, VCRs. Digital cameras, Web TV, and PDAs (personal digital assistant) were not even imagined by most people. The rapid pace of these changes challenge our existing mindset; even as it opens new possibilities.

Trends in Technology

Significant trends in hardware convergence, connectivity and digitalization continue to impact the evolution of technology and, subsequently, of education.

An explosion of hardware convergence, the merging together of single function apparatus to serve a variety of purposes, makes it possible for computers, for example, to also serve as cell phones and TVs.

Broadband connectivity will profoundly enhance our ability to get information off the Internet, and to provide new ways to instruct students.

A trend toward broadband connectivity, especially wireless communication, has significant implications for mobile and rural populations. In the very near future, cable companies, digital telephone hook-ups like DSL, and things like low earth orbit satellites will deliver high speed, digital-to-digital access to information into homes and schools, even in the most rural areas. By 2003 about 60 million households will be online in a broadband connection. There are different kinds of broadband connections. Schools are hardwired into networks. Some states have Internet II, which is a non-commercial network with very high velocity.

There is now more information on the Internet than there is in print giving Internet access to extraordinary amounts of data.

Digitalization, converting information to digital information, is the third area that continues to change. The implications of content digitization for education are significant.

New Modalities for Instruction

Stand-alone computers, computers we put on our desktops, laptops that we might take to camps, are definitely beginning. Schools are now using network-centered computers that are designed to be connected to a network whether it is a wireless network or a wired network.

Some new relatively inexpensive technology modalities are influencing the delivery of instruction.

Imagining devices such as a watch that shoots photographs and digital cameras are less expensive and easier to use. These are wonderful tools for constructivist education. They allow students to create meaning from images and use it as a basis of learning.

WebTV uses a standard television, a telephone, and a WebTV appliance to deliver courses and supplemental instruction via the Internet. It provides students with access to the wealth of information available from the Internet, connects the home and school, extends the learning day, and has potential for continuity of instruction for mobile populations because, as learners move, it tracks their progress. Web based instruction is interactive; learners can communicate with other learners and receive feedback from the teacher

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through email. Some publishing companies like RiverDeep (http://www.riverdeep.net) and SkillsTutor (http://www.skillstutor.com) are creating comprehensive curriculum for the Internet. Some educational technology programs including The Migrant Education Consortium for Higher Learning (MECHA) (http://mecha.barry.edu -see page 26), and the Centennial BOCES' WebTV Project (www.net-tlc.org -see page 29) have used Web TV with migrant and rural populations with good results. PDAs is a significant educational technology tool for the immediate future. These small, inexpensive devices are made for wireless connections and can perform a variety of functions. Multiple kinds of information including images and graphics can be uploaded into the device. PDAs are used in the Kentucky Migrant Technology Program (http://www.migrant.org - see page 27.)

Vision for Migrant Students

Today technology is available to address the migrant lifestyle issues of mobility, limited financial resources and rural residency. The decrease in technology costs and the increase in inexpensive, portable appliances like WebTV and PDAs, open new opportunities for access to the Internet and for participation in distance learning options. New online learning programs like The Study Place (www.thestudyplace.org) developed by Cyberstep (www.cyberstep.org), currently being tested in migrant camps in California, bring quality educational material to online learners.

The concept of anytime, anyplace, any pace learning is a reality.

In areas that have a telephone provider that can provide DSL, IIIG (Third Generation wireless) gives inexpensive access to the Internet and for online instruction. Many computers can connect to one DSL line. In about five years standard wireless phones will have the ability to access the Internet through IIIG. When information is needed it will be pulled off a network, whether it is a wired network or a wireless network. This has real significance for mobile populations. But the most significant opportunity for access to the Internet right now, especially for mobile populations, is through the Hughs satellite Starband (www.starband.com). With a 24-inch disc and a shot at the southern sky, rural populations can have two-way, always on, high-speed Internet service, an option that was not possible six months ago.

Fleischman provided a list of useful websites for intergenerational literacy programs. See **Appendix C**.

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Step 6:

Review online learning programs, available software and education technology models; and select those that will help you achieve your goals.

Michael Franken
Director
Kentucky Migrant Technology Project
Ohio Valley Educational Cooperative

Mike Abell
Co-Director
Kentucky Migrant Technology Project
Ohio Valley Educational Cooperative

Online Learning

Michael Franken and Mike Abell profiled the powerful role of online learning and instructional technology in education. It can engage students with the knowledge base they are investigating, has the capacity to advance their academic success and to enhance their self-esteem. It is essential that we figure out how to integrate technology with classroom instruction and use its full capacity to support migrant students' academic achievement and development of higher order thinking skills.

Approaches to Online Learning

There are four main approaches to online learning, and the approaches differ from one another with regards to the variables of time, student-teacher interaction and learning material. Is there a set time or a variable time in which the students are connected to a teacher or to online material? Do students study independently, or with a mentor, or some combination? Is the material of a caliber that will move students into higher levels of thinking and working? The online learning approaches include the following:

- **Virtual High School:** This model has an entire high school program made available to students in a state or region. The entity can usually grant credit. An online instructor, a live body at the other end helping to deliver the instruction and connect with the student, is an important element. It is interactive; and it is bound to a time frame when the instructors make themselves available to students.

Technology compacts great amounts of information, brings it quickly to the student, organizes it in different fashions, and enables teachers to help their students be better learners.

- **Stand Alone Course:** This model is designed for students at any grade level and usually supports classroom studies. The school determines whether it will grant credit for the course or the course in combination with the student's work in class. A majority of the work is found online.

- **Online Correspondence Course:** This model focuses on high school students working independently to complete courses that they have lost or were not able to complete. It usually requires a textbook, but there are supplemental online materials.

- **Supplemental Online Model:** This model is a supplemental classroom tool with material aligned to core classes and can bridge to classroom instruction. If students are behind in a class, they can go online and work on that section of the course. All content is online and is embedded with hyperlinks that allow students to get more information or drill if needed.

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General Considerations That Impact Online Learning

- **Convenience:** When the technology works well, online learning is convenient.
- **Cost:** Costs include purchase and maintenance of equipment, professional development and ongoing support for teachers, support to parents in the homes, and development or purchase of instructional materials.
- **Quality Instructional Content:** Strong content linked to learning standards. Textbook companies are moving their texts online. The next generation will move textbooks into individual components allowing students to customize material for their own use.

Migrant Education Issues Related to the Current Status of Online Learning

Strong content that is appropriate for migrant students, affordable access, integration with classroom instruction, and instructional approaches are issues related to the current use of technology as a learning tool for migrant students.

- **Anytime, Anywhere Learning:** The vision of 24 hours a day 7 days a week is very powerful.
- **Strong Content:** Migrant educators need to search out or develop programs, beyond what is typically found in software packages, with strong content that supports higher order learning, and that really work with migrant students. Content needs to be culturally sensitive, presented in multiple languages, tied to classroom instruction, and related to the real world. Programs should allow students to design their own learning.
- **Affordable Access:** What technology is available that can give migrant students easy, affordable access to online learning? Right now access is limited because of the way information is delivered both in terms of speed and bandwidth.
- **Integration with Classroom Instruction:** How can online learning be integrated with traditional classroom instruction in a way that supports student achievement for migrant students?
- **Instructional Approaches:** What professional development is needed to support teachers as they adopt new approaches to the student-centered, individual learning that is generated by use of technology in education? How can teachers blend online instruction with traditional instruction in a way that is powerful, harmonious and productive?

Online learning is in its infancy right now but it is a part of the future and migrant children are a part of that future. Online learning and Internet access can play a significant role in their growth as individuals and as contributing members of society.

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Educational Technology Models

The following is basic information about the five Technology Grants for Coordinating Teaching and Learning in the Migrant Community Projects funded by the Office of Migrant Education, three Technology Innovation Challenge Grants, a Colorado state project for migrant students, and a California Migrant Education project.

The Anchor School Project

Project Goal: The purpose of the Anchor School Project is to use technology in innovative ways to improve learning and achievement for migrant students and families, to provide greater continuity of instruction for migrant students, and to provide opportunities for migrant students to achieve the same high standards as all students.

Description: The Anchor School Project is a family based project and has six key components.

- Electronic Lifeline – a web based electronic portfolio that houses demographic student achievement information, goals, interests, activities, and assessment tools for teachers.
- Curriculum and instruction – aligned to the state content standards of the states of Florida, North Carolina, South Carolina, Tennessee and Georgia.
- Professional development activities.
- Family involvement – including bilingual training in basic computer skills, and software programs, digital cameras, the Internet and email. Thirty families are given laptop computers and required to learn to operate them. Parents agree to use the computer to help their children with school assignments and to check with their children's teachers via email.
- Collaboration – with a variety of organizations including ESCORT, the University of South Florida, and the Gargiulo, Inc., a grower that employs many of the project families.
- Human Lifeline – an instructional support team made up of Americorp workers, college students and teachers who travel with students when they leave south Florida.

Web Site: www.anchorschool.org

Contact: Christina Stern cstern@serve.org

Funding Source: Technology Grants for Coordinating Teaching and Learning in the Migrant Community, US Department of Education, Office of Migrant Education

Location: Three elementary schools in Kyer County, Florida and five summer school programs in north Florida, South Carolina and North Carolina.

Population Served: 2000 migrant students and families.

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ESTRELLA

Encouraging Students Through Technology to Reach High Expectations in Learning Life Skills and Achievement

Project Goal: The goal of the ESTRELLA Project is to increase graduation rates and provide educational and career options for migrant students through coordination with home base and receiving states and the application of laptop computers and telecommunication technologies.

Description: Migrant students are given laptop computers to take with them as they travel from Texas to receiving states. The laptops give students access to online courses and curriculum available through NovaNET. College student "cyber mentors" correspond with migrant students through email to provide encouragement, information about college life, and to act as role models. Parents participate with their children in computer training workshops to learn to use technology to support their children's education and to meet their own educational goals. Ongoing professional development is provided through hands-on and online learning opportunities.

Web Site: www.estrella.org

Contact: Brenda Pessin, Director info@estrella.org
Jeri Kinser, Instructional Technology Specialist info@estrella.org
Benjamin Macias, Interstate Student Coordinator benjamin_macias@msn.com

Funding Source: Technology Grants for Coordinating Teaching and Learning in the Migrant Community, US Department of Education, Office of Migrant Education

Location: Based in Illinois, ESTRELLA coordinates with sites in Montana, Texas, New York and Minnesota.

Population Served: Thirty-five to fifty migrant secondary students whose families are home based in Texas and travel to locations in coordinating states.

MECHA

Migrant Education Consortium for Higher Education

Project Goal: The goal of the MECHA Project is to provide academic and educational continuity to migrant students and their families as they travel through a six-state corridor.

Description: Barry University, Miami-Dade County Public Schools' Migrant Education Program, Public Television, WebTV and other telecommunications and software publishing industry partners use Internet based technology to provide families with supplemental instructional activities. While in Miami, college student mentors provide children with in-school and after-school academic and homework assistance. Selected migrant students are issued a WebTV for family use as a communication and instructional tool for classroom and distance learning. Using the Web TV software and other technology, the MECHA project provides instructional continuity by maintaining contact with the selected families via the MECHA Web Site as the families travel.

Web Site: http://mecha.barry.edu

Contact: Janie Greenleaf, Project Administrator jgreenleaf@mail.barry.edu

Funding Source: Technology Grants for Coordinating Teaching and Learning in the Migrant Community, US Department of Education, Office of Migrant Education.

Location: Miami based project tracking families in a six state corridor that includes Florida, Georgia, South Carolina, North Carolina, Virginia and Pennsylvania.

Population Served: 570 mobile migrant families home based in Miami, Florida.

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InTIME

Integrating Technology Into Migrant Education

Project Goal: The goal of the InTIME Project is to develop and demonstrate increased uses of technology that strengthen the academic achievement of migrant children in Oregon.

Description: A multifaceted project with 11 subprojects, InTIME uses a variety of hardware and software applications to support migrant students' education. The approaches of the subprojects range from the use of technology to manage student records to ensure students' timely enrollment in new schools, to computer assisted programs that help students acquire specific academic skills, to the development of educational material for online learning. Staff is trained to use technology as an instructional tool, to use hardware, software, and to troubleshoot. Students are trained to use technology to access information and to be technology leaders in schools.

Web Site: http://www.intime.K12.or.us

Contact: Ernestina Garcia, Director tina.garcia@wesd.org and John Tenny, Coordinator jtenny@willamette.edu

Funding Source: Technology Grants for Coordinating Teaching and Learning in the Migrant Community, US Department of Education, Office of Migrant Education.

Location: School district and Migrant Education sites in Oregon.

Population Served: Migrant eligible children in Oregon.

Kentucky Migrant Technology Project (KMTP)

Project Goal: The goals of the Kentucky Migrant Technology Project are to (1) help migrant students reach high achievement levels through improved technology, and (2) promote greater continuity of instruction through online instruction.

Description: Over 50 courses for students in grades 6-12 have been developed by KMTP and can be accessed through the project's web site. The courses are aligned to national learning standards, embedded with over 20,000 hyperlinks, and translated in English and Spanish. Project students are given PDAs (small, portable, durable personal digital assistant) which they use to download learning modules to take with them as they travel. Teachers are support with technology training, with integration of technology into their instructional practices and with face-to-face and online ESL training. Parents participate in classes designed to give them new education resources, skills to use and maintain technology appliances, and ideas to enhance learning in their homes.

Web Site: www.migrant.org

Contact: Michael Franken, Director mfranken@ovec.coop.k12.us
Mike Abell, Co-Director mabell@ovec.coop.k12.us

Funding Source: Technology Grants for Coordinating Teaching and Learning in the Migrant Community, US Department of Education, Office of Migrant Education.

Location: Public schools in central and western Kentucky that have high enrollments of migrant students.

Population Served: 350 migrant students, their parents and their teachers, and approximately 2000 additional students through the projects' online virtual high school.

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The BorderLink Project

Project Goal: The mission of the BorderLink Project is to remove barriers to post-secondary opportunities for rural, under-served students.

Description: BorderLink partners with colleges, business groups and online Web sites to help students through state-of-the-art technology, delivery of AP and college level classes, online SAT preparation, career awareness, computers on loan for home use, broadband high speed fiber connectivity in California's Imperial County Comprehensive High Schools, two-way videoconferencing units in high schools, a mobile vehicle for wireless training for teachers and students in areas that do not have Internet access, and ongoing intensive professional development for teachers, counselors and administrators.

Web Site: www.borderlink.org

Contact: Linda Brown, Co-Coordinator lbrown@icoe.K12.ca.us
Carol Kerney, Co-Coordinator ckerney@sdcoe.K12.ca.us

Funding Source: Technology Innovation Challenge Grant, US Department of Education.

Location: 12 high schools in Imperial and rural San Diego Counties in California.

Population Served: High school students in the target schools who:

- are already college bound;
- have high potential including AVID students (Advancement Via Individual Determination); and
- are English language learners.

Silicon Valley Challenge 2000 Multimedia Project

Project Goal: The goal of the Challenge 2000 Multimedia Project is to help students learn subject matter and work place skills through education practices that employ project-based learning.

Description: Through intensive ongoing professional development activities teachers are trained to use project-based teaching strategies in their classrooms. Professional development activities feature summer institutes, monthly work-days with release time from school, networking opportunities, coaching and technical support, and rewards in the form of mini-grants that can be used to purchase technology appliances and software for use in their classes. Using a variety of multimedia applications, students demonstrate their new knowledge and skills in the course of planning, designing and producing multimedia products. Instructional units are based on state content standards and include the following seven dimensions: (1) collaborative group work; (2) multidisciplinary core curriculum; (3) sustained effort over time; (4) student decision-making; (5) real world connections; (6) ongoing assessment; and (7) multimedia as a tool.

Web Site: http://www.kn.pacbell.com/wired/bluewebn

Contact: Joe Becerra jbecerra@ed.co.sanmateo.ca.us

Funding Source: Technology Innovation Challenge Grant, US Department of Education.

Location: 23 school districts in southern San Mateo and Santa Clara County.

Population Served: Elementary public school students.

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CYBER HIGH

Project Goal: Cyber High has been developed to further the goal of rescuing high-risk students from dropping out of high school.

Description: Cyber High is an electronic high school with curriculum aligned to California content standards. Courses are accredited through Fresno Unified School Board and credits can be issued through Roosevelt High School in Fresno. Students enroll in classes, receive instruction and take tests via the Internet.

Web Site: http://www.cyberhigh.fcoe.k12.ca.us

Contact: Guido Prambs gprambs@fcoe.k12.ca.us
Carol Lopez clopez@fcoe.k12.ca.us and David Yoshihara dyoshihara@fcoe.k12.ca.us

Funding Source: Technology Innovation Challenge Grant, US Department of Education.

Location: Fresno County Office of Education.

Population Served: Any student with Internet access.

Net-TLC - Networks for Technology Learning Communities and the WebTV Project

Project Goal: The goal of Net-TLC and the WebTV Project is to strengthen students' academic achievement by providing professional development opportunities to ESL teachers through access to Internet resources, other ESL teachers, and cyber coaches, and providing WebTV to families.

Description: Centennial BOCES, Greeley, Colorado, in partnership with Dream Team Technologies supports four interactive networks that connect ESL teachers in rural areas of Colorado and provides them with online support and teaching resources. In addition, in a pilot project WebTVs are placed in the homes of 50 selected students giving them and their families access to computers, email, the Internet and CD-ROMs to support children's education and give parents opportunities to complete their own education through distance learning.

Web Site: www.net-tlc.org

Contact: Margaret Walpole, Director of Compensatory Education mwalp@net-tlc.org

Funding Source: Colorado Goals 2000 CASSI Grant, and Title I Migrant Education funds.

Location: Centennial BOCES in rural Greeley, Colorado and its member districts.

Population Served: Students at risk of not meeting state or local content standards, migrant students, ESL students and their teachers.

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MSIN Project

Migrant Student Information Network

Project Goal: MSIN's purpose is to provide data collection, reporting and student tracking services for the California Department of Education's Migrant Education Program.

Description: The MSIN Project collects data, and reports, and maintains a student locator for 240,000 migrant students in California. MSIN is a model of cooperation and collaboration involving WestEd and other software vendors, California State Education Department, 22 regional migrant education offices, and the California Student Information Services. The project maintains school enrollment, supplemental service, health and other information on students.

Contact: Jacinto Salazar jsalazar@wested.org

Funding Source: Title I Migrant Education.

Location: California state-wide project.

Population Served: State and regional Migrant Education Programs.

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Step 7:

Identify collaborative partners and resources that can help you carry out your technology plan.

Bernie Trilling
Director of Technology in Education
WestEd Regional Technology in Education Consortia

Jacinto Salazar
Project Director of the California Migrant Student Information Network
R*TEC Digital Divide Initiatives

WestEd is a nationwide research development service agency that serves as a catalyst, mentor, partner and advocate for learners and learning.

Partnerships

The important role that effective collaborative partnerships among education, business, and governmental agencies can play in moving Migrant Education forward with technology was emphasized by Bernie Trilling and Jacinto Salazar of the WestEd Regional Technology in Education Consortium (R*TEC).

A WestEd needs assessment study determined five areas of need.

- Teachers need training on the use and effective integration of technology.
- Principals need leadership training to be able to support the staff.
- Schools need resources to support the whole process.
- There is a need to track emerging technologies in order to stay current.
- There is a need to promote collaboration and sharing.

A Model for Building Partnerships

From WestEd's experience, successful partnerships between agencies that share interests and goals can strengthen and broaden the range of services offered to migrant students. Effective collaborations are built on negotiated agreements that specify tasks to be preformed by each partner and are sustained by open communications, periodic evaluations, and involvement in ongoing activities that bring together resources and linkages. The following is a multi-step model for building effective partnerships. At each of seven decision points in the model, the potential partners can decide to back out or continue building the partnership. The seven steps follow.

- Identify a potential partner.
- Obtain a sense of compatibility. Are the potential partners engaged in compatible kinds of work?
- Determine mutual interests and potential risks for partners. Use diligence to determine that everything is okay with the potential partner.
- Validate the partner information and identify partner tasks and costs. Strong partnerships are built on some common activity and probably some common funding too.
- Negotiate the terms of the partnership and develop a written agreement.
- Incorporate partners in daily processes. This is the work stage.
- Evaluate the partnership. Evaluation should be ongoing and may direct the partners back to a previous step.

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Resources for Collaboration

The following five web sites are a preliminary list of references to government and private grants and funding resources that support technology in education. A sample of the links provided at each of the five sites is listed.

Technology Grant Programs http://www.ed.gov/Technologies/edgrants.html This US Department of Education site contains descriptions and links to government grants and resources including the following programs.

- *Preparing Tomorrow's Teachers to Use Technology* – helps prepare teachers to integrate technology into curriculum.
- *Star Schools* – supports projects that utilize distance learning technology.
- *Technology Literacy Challenge Grants* – grants to schools to implement plans to meet national educational technology goals.
- *Technology Innovation Challenge Grants* – to improve preK-12 achievement by supporting research of promising practices and technologies.
- *Coordination Program Technology Grants for Migrant Education* – to explore the use of technology to address education issues that traditionally plague migrant children.
- *Interagency Education Research Initiatives* – federal partnership to improve preK-12 achievement by supporting research on educational practices and technologies.

Enhancing Education Through Technology http://www.ed.gov/inits/nclb/partx.html This US Department of Education web site provides an overview of Part B: Grants for Education Technology.

Related Links and Publications http://www.ed.gov/offices/OVAE/CTC/ctclinks.html This Community Technology Centers web site includes links to the following resources.

- *Community Technology Centers Network* – more than 250 community centers where people can get access to computers and computer related technologies such as the Internet. Center start-up manual is available online.
- *Neighborhood Networks* – community-based initiative encourages development of resource and community learning centers in HUD assisted housing.
- *The Digital Divide Network* – helps bridge the digital divide through the sharing of ideas, information and solutions among foundations, government, nonprofits, and business partners.
- *21st Century Community Learning Centers* – enables schools to provide safe environments extended day for, among other things, technology education programs.

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- *Technology Opportunities Program* – competitive grant to bring advanced information infrastructure to communities.

Ask ERIC http://ericir.syr.ed/cgi-in/print.cgi/RTechnology_Funding/Technology_Grants.html Maintained by Education Information Resource Center, this site has links to Internet sites and discussion groups including the following.

- *Primer on Federal Education Technology Funding* – basic current technology funding and discusses various federal programs.
- *Pitsco's Launch to Grants and Funding* – resource for technology related funds.
- *EdLiNC: Education and Library Networks Coalition* – information about telecommunications discounts for schools and libraries.

Distance Education Clearinghouse www.uwex.edu/disted Managed and produced by the University of Wisconsin Extension, this site provides a wide range of information about distance education and related resources that includes foundations, businesses and education grant programs. A partial list of the site's links (as of July 2001) includes:

- *Computer Edge* – free public service that matches the technology needs of schools with excess computer equipment of individuals and corporations;
- *Distance Learning Funding Sourcebook* – research on funding sources for telecommunications for, among others, schools, nonprofits and grassroots community organizations;
- *Education First from Pacific Bell* – interested in helping schools and libraries make the most effective use of technology in life-long learning;
- *GrantsWeb* – maintained by Penn State, it directs to grants-related information on the Internet;
- *Grants and Other Funding* – an annotated list of funding sources that focus on , among other topics, educational technology; and
- *SchoolPC* – funds for schools with unique ideas for integrating technology into curriculum.

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Observations of Migrant Education Directors

Four State Directors of Migrant Education summarized the information they gained from the seminar, and linked their understandings of technology education to migrant education programs. The State Directors were Elizabeth Alfred from Nebraska, William Cosme from Arkansas, Larry Jaurequi from California, and Nancy Croce from New York .

Alfred: Betty Alfred stressed that, as migrant education programs plan for technology, it is important to remember that migrant education is a supplementary program and must look for ways to supplement the services offered by school districts that have the first responsibility for the education of migrant children. She emphasized that, in addition to advocating for services that are available in schools, it is important to use resources already available in the Migrant Education Program. For example, one migrant project in Nebraska uses a computerized diagnostic and prescription learning program that was purchased 20 years ago and that is still a valuable tool for diagnosing children's academic skills and prescribing appropriate learning programs.

Elizabeth Alfred
State Director
Migrant Education Program
Nebraska Department of Education

"It isn't just the technology, it's the use of technology. And in the use of technology you cannot and should not eliminate the parent. Parents are vitally important. They need to know what their children are doing."

To provide supplementary technology services and educational opportunities to migrant students, the Nebraska Migrant Program has developed partnerships with employers of migrant families and with the Title I Committee of Practitioners to build resources that can provide migrant students with access to technology. With funds from the Title I Committee of Practitioners a state resource center for technology that houses two types of technology has been established. The center has an online library available to students who have Internet access, and laptop computers that can be borrowed by migrant students. Through a partnership with the Excel Meat Packing Plant a Family Learning Center has been built at Scalar, Nebraska and a second one is planned for the northern part of the state.

Alfred expressed two concerns. First she emphasized that technology is totally inaccessible to some migrant families who live in facilities without telephone service or electricity. For families who live in those situations the best education tool we can provide may continue to be the book. Second, for students who have access to the Internet, it is vital to involve parents so that they can support and supervise their children's use of technology.

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William Cosme
State Director
Migrant Education Program
Arkansas Department of Education

"I read a review that said that technology increases student achievement by 50 percent and for me it reaffirmed some of the things we are doing in the state of Arkansas, . . . we must look closely at what's happening with technology to make sure our kids are included."

Cosme: William Cosme stressed the importance of advocating for migrant children to be included in all aspects of education technology offered to all students in local school districts, and then to supplement those services for migrant students. In that regard, the Arkansas Migrant Education Program has purchased the Skills Tutor software to augment migrant students' education. In addition, through supplementary programs some migrant students have acquired considerable technology skills and are actually more knowledgeable about the use of the computer than their teachers or classmates. These students become technology leaders in their classes which is a source of pride and enhanced self-esteem for them.

Cosme emphasized the importance of tracking mobility trends for families and establishing working relationships with other states that serve the same families. Through partnerships with other states, continuity of educational technology, as well as other education services to migrant students can be assured.

The Arkansas Migrant Education Program has established a technology lab at the Hope Stopover in Hope, Arkansas. Families who stop at the Hope Stopover can gain access to the Internet through that lab.

Cosme pointed out that states are not all on the same level with regards to the implementation and use of technology. As a result, technology implementation plans will vary from state to state. To that end, flexibility in planning is important.

Larry Jaurequi
State Director
Migrant Education Program
California Department of Education

"I would like you to think about this within your respective states . . . within your education codes what is your state plan in terms of technology? What policies are being developed at the local level? Is migrant mentioned?"

Jaurequi: Larry Jaurequi urged migrant educators to advocate for the inclusion of "migrant" in the language of their states' technology education codes and regulations, and to become involved as planners in the development of policies at state and local levels. He recommended sitting on advisory councils, and exploring networks and resources to leverage funding for technology for migrant students.

Jaurequi reminded seminar participants of several federal programs that require technology planning in their regulations. He suggested that migrant educators review the language of those programs in their states to determine how technology and migrant are included.

- All states that receive Title I Migrant dollars have a State Consolidated Plan, and technology must be mentioned in that plan. States that receive Title I funds should have on record at the State Education Department a School Improvement Plan. What are those plans and do they include migrant?
- In terms of the state's migrant education funds, how does technology play a part in the delivery of services, in the curriculum and in instruction.
- Look at Comprehensive School Reform Demonstration (CSRD) projects that target low performing schools that do not make measurable gains in meeting state standards. Are migrant children enrolled in those schools? How is technology included in their curriculum and program?

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Croce: In her remarks, Nancy Croce stated that the New York Migrant Program is in the process of purchasing laptop computers for tutor advocates who work with migrant students in homes and in camps. She emphasized the importance of choosing appropriate software integrated with curriculum and with the learning standards of the state, and of implementing an ongoing professional development program to support staff and to ensure the success of the technology program. She sees technology as an opportunity to teach English to those migrant students who are learning English as a second language, to provide migrant students with the opportunity to learn more about their own country and culture, and to bring about social change in rural communities.

Croce pointed to the tremendous costs involved in providing technology to students and the need to leverage available funds and identify new revenues. She suggested looking for new funds at the federal level and working with existing state and interstate programs to leverage currently available money. Libraries, after school programs and community centers are places that can provide migrant students with Internet access. She pointed to the possibilities for Internet access offered by WebTV to migrant families who have televisions and telephones.

Finally, while educational technology is a valuable tool to use in the overall education program and can be a real breakthrough for students who are experiencing difficulty in school, it must be used in conjunction with other important efforts such as the preschool program and the adolescent program. Just buying computers will not be enough. You still need the tutor to go out and work with the student.

Nancy Croce
State Director
Migrant Education
New York State Education Department

"We're a supplementary program, so we have to provide technology when it's not available. Even if our children have access to computers in school, they go home and they do not."

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Summary of Implementation Steps for Technology for Migrant Students

Based on the observations of the State Migrant Education Directors who served as panelists, and the insights of the seminar speakers, the following action steps are recommended strategies for the development and implementation of education technology plans for migrant students.

1. **Determine the technology skills students should have at each grade level.**
- Determine technology competencies that students need to graduate from high school and to enter the job market.
- Examine your state's content standards to see if your state addresses technology with separate standards, or with standards that are embedded in content areas. If technology standards are embedded, determine how they integrate with the content areas.
- Compare your state's standards for technology to the national NETS standards.
- Compare your state's standards with the standards of other states that migrant students are exposed to in their travels.

2. **Examine the research regarding the relationship between the use of technology and student achievement.**
- Examine web sites, and educational journals to find research studies that discuss the impact of technology on student achievement.
- Decide what use of technology will best support the educational needs of migrant students based on the research.

3. **Develop a technology implementation plan.**
- Determine how online learning can be used by your students to support or supplement classroom instruction, or to make up lost credits.
- Decide how program activities can supplement technology used in the schools attended by migrant students.
- Advocate for equal opportunities to access school-based technology programs.
- Develop an evaluation plan that will indicate the success of your technology implementation on student achievement.
- Look for funds for infrastructures within your program, purchase of hardware, software and appliances, staff development for teachers, administrators and community members.

4. **Implement professional development strategies that support teachers and administrators.**
- Determine skills needed by teachers, tutors and program administrators to be effective as educators of migrant students.
- Survey staff to determine what technology skills they already have.
- Train teachers to integrate technology into their curriculum, to use project-based teaching methods, and to use computers to explain difficult concepts.
- Decide how ongoing professional development will be implemented and supported.
- Plan for follow-up assistance to teachers at their local program sites.
- Decide how online staff development programs can be used by teaching staff to upgrade their skills.
- Plan for peer support among teachers.
- Advocate for teacher training courses in institutions of higher education that prepare teachers to teach through technology and to teach migrant children.

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5. **Determine the technology that will best accomplish your plan.**
- Decide how access to the Internet can be made available for all students including those who do not have telephones in their homes.

6. **Review online learning programs, available software and education technology models; and select those that will help you achieve your goals.**
- Tap federally-funded resources such as NCREL to provide migrant students with the best available technology education.
- Replicate successful technology models such as the Technology Grants for Coordinating Teaching and Learning in the Migrant Community projects.
- Build Spanish language web sites.
- Develop, or work with commercial companies to develop strong technology programs that have good content and are multi-lingual.
- Conduct an audit of the hardware, software, and technology tools that are already owned by your program or available in the schools attended by migrant students.
- Purchase new hardware, software, and technology tools to compliment what is already available.

7. **Identify collaborative partners and resources that can help you carry out your technology plan.**
- Frame a vision as to how adequate access to technology for migrant children in your state can be achieved.
- Work with legislators and policymakers to determine how technology is addressed and how it should be addressed in your state.
- Collaborate with businesses, state legislators, and community groups to create new resources in the public and private sector.
- Explore communication networks.
- Address the issue of underutilization of technology equipment in the schools that migrant students attend.
- Figure out the other dollars that exist, and bring them to work for migrant students.
- Bring the issues and concerns down to the local level.
- Focus on local Parent Advisory Councils and parents to bring about changes in attitudes and practices.

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Appendix A

Comparison of California Technology Standards with ISTE Technology Standards

As an example of how Migrant Education Directors can compare their state's learning standards for technology to the ISTE standards, Bridget Foster compared the technology standards embedded in California's content standards (http://clrn.org) for English-Language Arts with the National Educational Technology Standards (NETS).

Overall, the California and the ISTE standards contain a continuum of three categories that range from basic skills to higher order use of technology.

- Proficiency skills - a beginning curriculum that teaches students specific skills needed to use technology such as how to turn on a computer, use a mouse, print, save a document, open a program.
- Producers of products – the next step in which students learn to create products that demonstrate their understanding of technology and their knowledge of content, a concept plus skill to presentation.
- Application to daily life – the final phase when, because students have a strong understanding of technology and its uses, they are able to make decisions about how to apply it to their daily life, to enrich and improve their environment.

Comparison of Selected California Technology Standards with ISTE Technology Standards at Various Grade Levels

Sample Standards from California Content Standards For English-Language Arts	Grade Level CA	Grade Level NETS	Sample Standards from National Educational Technology Standards
Demonstrate basic keyboarding skills and familiarity with computer terminology – cursor, software, memory, disk drive, hard drive.	4	PK-2	Use input devices – mouse, keyboard, remote control, and output devices – monitor, printer, to operate computers, VCRs, audiotapes, telephones and other technologies.
Create simple documents by using electronic media and employing organizational features – passwords, entry and pull-down menus, word searches, the thesaurus, spell checks.	5	PK-2	Create developmentally appropriate multimedia products with support from teachers, family members or student partners.
Use organizational features of electronic text to locate information – bulletin boards, databases, keyword searches, email addresses.	6	3-5	Use telecommunications efficiently to access remote information, communicate with others in support of direct and independent learning, and pursue personal interests.
Create documents by using word processing skills and principles of design – margins, tabs, spacing, columns, page orientation.	7	6-8	Design, develop, publish and present products – Web pages, videotapes – using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom.
Plan and conduct multi-step information searches by using computer networks and modems.	8	6-8	Demonstrate an understanding of concepts underlying hardware, software and connectivity and of practical applications to learning and problem solving.
Design and publish documents by using advanced publishing software and graphic programs.	9-10	9-12	Select and apply technology tools for research, information analysis, problem solving, and decision making in content learning.
Integrate databases, graphics and spreadsheets into word-processed documents.	11-12	9-12	Use technology tools and resources for managing and communicating personal/professional information – finances, schedules, addresses, purchases, correspondence.

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Appendix B
Online Initiatives for Professional Development

Peggy Kinder summarized several online initiatives that offer effective professional development opportunities to educators.

- **Teacherline** (http://www.pbs.org/teacherline) This innovative PBS program is funded with a grant from the US Department of Education and works in collaboration with local broadcasting stations and colleges. It is a comprehensive professional development web site that focuses on mathematics and on the integration of technology into the classroom. The video-rich, self-paced site features core content that can be customized, up-front training, a self-assessment instrument, activity suggestions - such as articles to read and web sites to visit – based on learner goals, and opportunities for learners to share lessons and experiences.

- **CTAP Online** (http://www.ctaponline.org) Created and maintained by the Butte County Office of Education Center for Distributed Learning, this site strives to help teachers understand and apply technology. Its reasonably priced courses are correlated to California and national learning standards. The site includes links to standards-based lesson plans, rubrics and technology sites, discussion forums, real-time chat, a document sharing tool that allows teachers to post materials, and webliography – a tool for sharing web resources.

- **TeacherUniverse** (http://www.teacheruniverse.com) Recently acquired by the RiverDeep Group, TeacherUniverse offers K-12 teachers dynamic, curriculum-based e-learning opportunities that integrate technology with curriculum to improve student performance. Its products are correlated to state and national learning standards and feature interactive problem solving approaches and real world applications. A unique teacher assessment instrument uses a technology integration rubric to evaluate teachers' skills. Scores are reported to school or program administrators and can be used as a basis for the development of inservice activities.

- **The California Partnership** (http://www.onlinelearning.net) This is a commercial site that works with the California University System to deliver teacher training material online. Professional degrees and certifications are offered in a variety of content areas. Instructors meet online with classes on a regular basis. Class size is limited to 25 students. At the beginning of each course perspective students are administered a test to help them determine if they have learner characteristics that will enhance the likelihood that they will succeed in an online learning environment. The course completion rate is a significant 80 percent due, in part, to the way classes are structured.

- **TEAMS Distance Learning** (http://teams.lacoe.edu) Funded in part by Star Schools legislation, this site offers learning opportunities to students, parents and teachers. Through a combination of televised satellite broadcasts and the Internet, learners have access to video-based instruction and multimedia Internet instruction. Professional development coaching is embedded in classroom activities. While teaching a particular lesson, teachers can ask questions and receive ongoing support.

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- **PREL** (http://www.prel.org) Under a contract with the US Department of Education, PREL operates a Regional Educational Laboratory. Through discussion, networking and resources, this site promotes educational excellence particularly in multicultural and multilingual environments.

- **Teachscape** (http://www.teachscape.com) With a focus on math and literacy skills, Teachscape supports professional development through Internet-based multimedia courses and on-site school support. Lesson plans are embedded with diagnostic assessments and dialogue with educators in an online community provide teachers and school leaders with ideas to improve the delivery of instruction.

- **OnlineLearning** (http://www.onlinelearning.net) Certifications, instructor-led classes and self-paced courses are features of this site. Its 70 professional development classes for teachers include instructional technology for educators. Instructor-led classes have specific start and end dates, are interactive and require textbooks.

- **Engauge** (http://www.ncrel.org/engauge/intro/intro.htm) This is an instrument available through the North Central Regional Educational Laboratory that helps districts that are working on a systematic initiative to integrate technology into the curriculum. The instrument profiles the district, asks about district goals, and suggests research based solutions that have worked in other environments.

- **SERC** (http://www.serc.org) With support from the Star Schools Program, the Annenberg Foundation and the National Science Foundation, the Satellite Educational Resources Consortium offers online field trips that focus on problem solving and using technology in science classes. Professional development is available through this site but not necessarily in technology. Registration is required, but there is no fee.

- **STAR-Online** (http://www.star-online.org) This is a Star Schools project that specifically deals with technology. Through "techknowledgy" modules educators gain knowledge and skills for using technology in classrooms. Also available to participants are communication tools, resources and support, and an online portfolio.

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Appendix C
Web Sites for Intergenerational Literacy

John Fleischman provided the following list of useful Web sites.

Professional Resources

America Reads
http://www.ed.gov/americareads
This site has information for teachers, family members and child care providers on helping young children learn to read.

The Children's Literature Web Guide
http://www.acs.ucalgary.ca/~dkbrown/index.html
This site contains Internet resources related to books for children and young adults.

ERIC Clearinghouse on Reading, English and Communication
http://www.indiana.edu/~eric_rec
This site contains educational materials, services and coursework for parents, educators and students interested in the language arts.

Family Literacy – NIFL LINCS Regional Hubs Special Collection
http://literacy.kent.edu/Midwest/FamilyLit/index.html
This site has fact sheets, locally produced materials, professional development, instructional links and news.

National Center for Family Literacy
http://www.famlit.org
You will find information about NCFL, publications, National Family Literacy Day, and links to other resources at this site.

Outreach and Technical Assistance Network
http://www.otan.dni.us
This site contains a comprehensive collection of online resources for adult educators.

Instructional Unit and Lesson Plan Resources

Blue Web'N
http://www.kn.pacbell.com/wired/bluewebn
Blue Web'N is a searchable database of about 1000 outstanding Internet learning sites categorized by subject area, audience, and type (lessons, activities, projects, resources, references, and tools).

GEM – The Gateway to Educational Material
http://www.thegateway.org
This site is the key to one-stop, any-stop access to high quality lesson plans, curriculum units and other education resources on the Internet.

Microsoft Lesson Collection
http://www.k12.msn.com
You will find a set of free tools to help teachers search for lesson plans that match their local or state curriculum standards. Microsoft site server-based technology searches through lesson plans indexed from multiple sites on the Internet.

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SCORE – Schools of California Online Resources for Educators
http://www.score.k12.ca.us
This site has resources and lesson plans in the areas of science, history, language arts, and mathematics. All lessons are categorized by grade level and based on a standards framework.

Instructional Resources

Ants on a Banana Bus
http://www.hamstertours.com/snacks.html
You will find ten-minute bedtime "tour snack" exercises.

Ask Dr. Math
http://forum.swarthmore.edu/dr.math/dr-math.html
Ask Dr. Math is a question and answer service for K-12 math students and their teachers. The site includes an extensive help guide and a searchable archive of math terms grouped by grade level and topic.

B.J. Pinchbeck's Homework Helper
http://www.bjpinchbeck.com
This site has extensive links by subject area; and is maintained by a pre-teenager!

Familiar Tales
http://www.familiartales.com
Familiar Tales specializes in the development of Web-based educational material designed to provide all children with equal access to high-quality learning environments. The literacy center content offers beginning level reading activities that include wonderful graphics and audio support.

Funbrain.com
http://funbrain.com
The title says it all.

Funschool.com
http://funschool.com
This site contains engaging educational content for children. Pages are updated regularly with new activities and curriculum.

KidsCom
http://www.kidscom.com
This is an educational and entertaining electronic playground for kids 4 to 15.

Little Explorers
http://www.enchantedlearning.com/Dictionary.html
This is a wonderful educational site for preschoolers and elementary school children.

NOVA Online
http://pbs.org/wgbh/nova
Learners will find a wide range of interesting subject matter and fun activities.

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WebMath

http://www.webmath.com

The WebMath site features fill-in forms where students can type in math problems that are giving them trouble. These interactive forms are linked to powerful programs that instantly analyze the problem and, when possible, provide a step-by-step solution.

Yahooligans!

http://www.yahooligans.com

This site is similar to Yahoo, but is designed to present links for children.

Comprehensive Learning Resources

RiverDeep

http://www.riverdeep.net

RiverDeep offers comprehensive online core curriculum in the areas of math, science and language arts.

SkillsTutor.com

http://www.skillstutor.com

SkillsTutor is content-based SkillsBank and CornerStone. The scope and sequence covers reading, writing, mathematics, language arts, information skills and job skills.

LiteracyLink

http://www.pbs.org/literacy

Workplace Essential Skills is a training resource that combines video, print, and Web learning. The series is designed for adults who do not have a job as well as those who wish to move from entry-level work to higher paying positions and careers.

Web Authoring Tools

Geocities

http://geocities.yahoo.com/home

This is one of the best web site development tools for both beginners and experts.

Homestead

http://www.homestead.com

This site is very easy to use and has powerful drop and drag tools.

The Study Place

http://www.thestudyplace.org

This is a resource from the Cyberstep Project that offers a very simple process for developing Web-based multimedia learning materials.

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Appendix D

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